

Serial No. 10/824,528

IN THE CLAIMS

The text of all pending claims, (including withdrawn claims) is set forth below. Cancelled and not entered claims are indicated with claim number and status only. The claims as listed below show added text with underlining and deleted text with ~~strike through~~. The status of each claim is indicated with one of (original), (currently amended), (cancelled), (withdrawn), (new), (previously presented), or (not entered).

Please CANCEL claims 1-36

Please ADD claims in accordance with the following:

1-36. (CANCELLED)

37. (NEW) An image-data processing apparatus for embedding a code into image data, said image-data processing apparatus comprising:

a dividing unit that divides the image data into a plurality of blocks;

a characteristic-amount extracting unit that extracts a characteristic amount of each of the blocks; and

an encoding unit that generates image data into which a code is embedded based on a magnitude relation between characteristic amounts of each pair of two blocks extracted by said characteristic-amount extracting unit, wherein

said encoding unit decides whether the magnitude relation between characteristic amounts of the pair of blocks coincides with a code to be embedded,

if the magnitude relation between the characteristic amounts of the pair of blocks coincides with the code to be embedded, then said encoding unit maintains the magnitude relation between the characteristic amounts of the pair of blocks extracted by said characteristic-amount extracting unit, and

if the magnitude relation between the characteristic amounts of the pair of blocks does not coincide with the code to be embedded, then said encoding unit calculates an average of the characteristic amounts of the pair of blocks, calculates respective new characteristic amounts for the pair of blocks by calculating a new characteristic amount for a block having a smaller characteristic amount in the pair of blocks by adding a predetermined value to the

Serial No.: 10/824,528

average and calculating a new characteristic amount for a block having a larger characteristic amount in the pair of blocks by subtracting a predetermined value from the average, and generates the image data in which the characteristic amount of each block in the pair of blocks is changed to the respective calculated new characteristic amounts.

38. (NEW) The image-data processing apparatus according to claim 37, wherein if the magnitude relation between the characteristic amounts of the pair of blocks does not coincide with the code to be embedded, and if a difference between the characteristic amounts is larger than an upper threshold, then said encoding unit does not change the characteristic amounts.

39. (NEW) The image-data processing apparatus according to claim 37, wherein if the magnitude relation between the characteristic amounts of the pair of blocks coincides with the code to be embedded, and if a difference between the characteristic amounts is smaller than a lower threshold, then said encoding unit changes the characteristic amounts in such a manner that the difference becomes equal to or larger than the lower threshold.

40. (NEW) The image-data processing apparatus according to claim 37, further comprising:

an error-correction-code generating unit that encodes the code to be embedded using error correction coding, to generate an error correction code,

wherein said encoding unit generates image data in which a plurality of error correction codes are embedded by associating the code based on the magnitude relation between the characteristic amounts of the pair of blocks with the error correction code generated by said error-correction-code generating unit.

41. (NEW) The image-data processing apparatus according to claim 37, wherein the pair of blocks is formed with two adjacent blocks.

42. (NEW) The image-data processing apparatus according to claim 37, wherein said characteristic-amount extracting unit extracts the characteristic amount from a portion of each of the blocks.

Serial No.: 10/824,528

43. (NEW) The image-data processing apparatus according to claim 37, wherein:
said characteristic-amount extracting unit extracts the characteristic amount related to a specific color,
said encoding unit decides whether the magnitude relation between the specific color related characteristic amounts of the pair of blocks coincides with the code to be embedded,
if the magnitude relation between the specific color related characteristic amounts of the pair of blocks coincides with the code to be embedded, then said encoding unit maintains the magnitude relation between the specific color related characteristic amounts, and
if the magnitude relation between the specific color related characteristic amounts of the pair of blocks does not coincide with the code to be embedded, then said encoding unit calculates an average of the specific color related characteristic amounts of the pair of blocks, calculates respective new characteristic amounts for the pair of blocks by calculating a new characteristic amount for a block having a smaller specific color related characteristic amount in the pair of blocks by adding a predetermined value to the average and calculating a new characteristic amount for a block having a larger specific color related characteristic amount in the pair of blocks by subtracting a predetermined value from the average, and generates the image data in which the specific color related characteristic amount of each block in the pair of blocks is changed to the respective calculated new characteristic amounts.

44. (NEW) The image-data processing apparatus according to claim 43, wherein:
said characteristic-amount extracting unit extracts the characteristic amount for a yellow component, and
said encoding unit embeds the code based on a magnitude relation between characteristic amounts for the yellow component.

45. (NEW) The image-data processing apparatus according to claim 37, wherein
said encoding unit adds a cut-out mark pixel in the image data in which the code is embedded.

Serial No.: 10/824,528

46. (NEW) The image-data processing apparatus according to claim 37, wherein said characteristic amount includes at least one of average density, granularity, chroma, density barycenter, and variance.

47. (NEW) The image-data processing apparatus according to claim 37, wherein said encoding unit repeatedly embeds a plurality of codes into the image data.

48. (NEW) An image-data processing method of embedding a code into image data, said image-data processing method comprising:

dividing the image data into a plurality of blocks;

extracting a characteristic amount of each of the blocks; and

encoding including generating image data into which a code is embedded based on a magnitude relation between characteristic amounts of each pair of two blocks extracted at said extracting,

wherein said encoding includes

deciding whether the magnitude relation between characteristic amounts of the pair of blocks coincides with a code to be embedded,

maintaining, if the magnitude relation between the characteristic amounts of the pair of blocks coincides with the code to be embedded, the magnitude between the characteristic amounts extracted at said extracting,

if the magnitude relation between the characteristic amounts of the pair of blocks does not coincide with the code to be embedded,

calculating an average of the characteristic amounts of the pair of blocks,

calculating respective new characteristic amounts for the pair of blocks by calculating a new characteristic amount for a block having a smaller characteristic amount in the pair of blocks by adding a predetermined value to the average and calculating a new characteristic amount for a block having a larger characteristic amount in the pair of blocks by subtracting a predetermined value from the average, and

generating the image data in which the characteristic amount of each block in the pair of blocks is changed to the respective calculated new characteristic amounts.

Serial No.: 10/824,528

49. (NEW) The image-data processing method according to claim 48, wherein if the magnitude relation between the characteristic amounts of the pair of blocks does not coincide with the code to be embedded, and if a difference between the characteristic amounts is larger than an upper threshold, the encoding includes not changing the characteristic amounts.

50. (NEW) The image-data processing method according to claim 48, wherein if the magnitude relation between the characteristic amounts of the pair of blocks coincides with the code to be embedded, and if a difference between the characteristic amounts is smaller than a lower threshold, the encoding includes changing the characteristic amounts in such a manner that the difference becomes equal to or larger than the lower threshold.

51. (NEW) The image-data processing method according to claim 48, further comprising generating an error correction code by encoding the code to be embedded using error correction coding,

wherein said encoding includes generating image data in which a plurality of error correction codes are embedded by associating the code based on the magnitude relation between the characteristic amounts of the pair of blocks with the error correction code generated at said generating.

52. (NEW) The image-data processing method according to claim 48, wherein the pair of blocks is formed with two adjacent blocks.

53. (NEW) The image-data processing method according to claim 48, wherein said extracting includes extracting the characteristic amount from a portion of each of the blocks.

54. (NEW) The image-data processing method according to claim 48, wherein:
said extracting includes extracting the characteristic amount related to a specific color,
and

said encoding includes

deciding whether the magnitude relation between the specific color related characteristic amounts of the pair of blocks coincides with the code to be embedded,

Serial No.: 10/824,528

maintaining, if the magnitude relation between the specific color related characteristic amounts of the pair of blocks coincides with the code to be embedded, the magnitude relation between the specific color related characteristic amounts, and

if the magnitude relation between the specific color related characteristic amounts of the pair of blocks does not coincide with the code to be embedded,

calculating an average of the specific color related characteristic amounts of the pair of blocks,

calculating respective new characteristic amounts for the pair of block by calculating a new characteristic amount for a block having a smaller specific color related characteristic amount in the pair of blocks by adding a predetermined value to the average and calculating a new characteristic amount for a block having a larger specific color related characteristic amount in the pair of blocks by subtracting a predetermined value from the average, and

generating the image data in which the specific color related characteristic amount of each block in the pair of blocks is changed to the respective calculated new characteristic amounts.

55. (NEW) The image-data processing method according to claim 54, wherein: said extracting includes extracting the characteristic amount for a yellow component, and said encoding includes embedding the code based on a magnitude relation between characteristic amounts for the yellow component.

56. (NEW) The image-data processing method according to claim 48, wherein said encoding includes adding a cut-out mark pixel in the image data in which the code is embedded.

57. (NEW) The image-data processing method according to claim 48, wherein said characteristic amount includes at least one of average density, granularity, chroma, density barycenter, and variance.

58. (NEW) The image-data processing method according to claim 48, wherein said encoding includes repeatedly embedding a plurality of codes into the image data.

Serial No.: 10/824,528

59. (NEW) A computer readable medium storing an image data processing program for embedding a code into image data by controlling an apparatus to perform operations comprising:

- dividing the image data into a plurality of blocks;

- extracting a characteristic amount of each of the blocks; and

- encoding including generating image data into which a code is embedded based on a magnitude relation between characteristic amounts of each pair of two blocks extracted by said characteristic-amount extracting,

- wherein said encoding further includes:

- deciding whether the magnitude relation between characteristic amounts of the pair of blocks coincides with a code to be embedded,

- if the magnitude relation between the characteristic amounts of the pair of blocks coincides with the code to be embedded, maintaining the magnitude relation between the characteristic amounts extracted, and

- if the magnitude relation between the characteristic amounts of the pair of blocks does not coincide with the code to be embedded, calculating an average of the characteristic amounts of the pair of blocks, calculating respective new characteristic amounts for the pair of blocks by calculating a new characteristic amount for a block having a smaller characteristic amount in the pair of blocks by adding a predetermined value to the average and calculating a new characteristic amount for a block having a larger characteristic amount in the pair of blocks by subtracting a predetermined value from the average, and generating the image data in which the characteristic amount of each block in the pair of blocks is changed to the respective calculated new characteristic amounts.

60. (NEW) The computer readable medium according to claim 59, wherein if the magnitude relation between the characteristic amounts of the pair of blocks does not coincide with the code to be embedded, and if a difference between the characteristic amounts is larger than an upper threshold, the encoding does not change the characteristic amounts.

Serial No.: 10/824,528

61. (NEW) The computer readable medium according to claim 59, wherein if the magnitude relation between the characteristic amounts of the pair of blocks coincides with the code to be embedded, and if a difference between the characteristic amounts is smaller than a lower threshold, the encoding changes the characteristic amounts in such a manner that the difference becomes equal to or larger than the lower threshold.

62. (NEW) The computer readable medium according to claim 59, wherein the operations further comprise encoding the code to be embedded using error correction coding to generate an error correction code, wherein

said encoding generates image data in which a plurality of error correction codes are embedded by associating the code based on the magnitude relation between the characteristic amounts of the pair of blocks with the generated error correction code.

63. (NEW) The computer readable medium according to claim 59, wherein the pair of blocks is formed with two adjacent blocks.

64. (NEW) The computer readable medium according to claim 59, wherein said extracting extracts the characteristic amount from a portion of each of the blocks.

65. (NEW) The computer readable medium according to claim 59, wherein:
said extracting extracts the characteristic amount related to a specific color, and
said encoding includes:

deciding whether the magnitude relation between the specific color related characteristic amounts of the pair of blocks coincides with the code to be embedded,

if the magnitude relation between the specific color related characteristic amounts of the pair of blocks coincides with the code to be embedded, said encoding maintains the magnitude relation between the specific color related characteristic amounts, and

if the magnitude relation between the specific color related characteristic amounts of the pair of blocks does not coincide with the code to be embedded, said encoding calculates an average of the specific color related characteristic amounts of the pair of blocks, calculates respective new characteristic amounts for the pair of blocks by calculating a new characteristic amount for a block having a smaller specific color related characteristic amount in the pair of

Serial No.: 10/824,528

blocks by adding a predetermined value to the average and calculating a new characteristic amount for a block having a larger specific color related characteristic amount in the pair of blocks by subtracting a predetermined value from the average, and generates the image data in which the specific color related characteristic amount of each block in the pair of blocks is changed to the respective calculated new characteristic amounts.

66. (NEW) The computer readable medium according to claim 65, wherein said extracting extracts the characteristic amount for a yellow component, and said encoding embeds the code based on a magnitude relation between characteristic amounts for the yellow component.

67. (NEW) The computer readable medium according to claim 59, wherein said encoding adds a cut-out mark pixel in the image data in which the code is embedded.

68. (NEW) The computer readable medium according to claim 59, wherein said characteristic amount includes at least one of average density, granularity, chroma, density barycenter, and variance.

69. (NEW) The computer readable medium according to claim 59, wherein said encoding repeatedly embeds a plurality of codes into the image data.

70. (NEW) An image-data processing system for embedding a code into image data and extracting a code embedded in image data, said image-data processing system comprising:

an image-data encoding device that includes:

a dividing unit that divides the image data into a plurality of blocks,

a characteristic-amount extracting unit that extracts a characteristic amount of

each of the blocks, and

an encoding unit that generates image data into which a code is embedded based on a magnitude relation between characteristic amounts of each pair of two blocks extracted by said characteristic-amount extracting unit, wherein

said encoding unit decides whether the magnitude relation between characteristic amounts of the pair of blocks coincides with a code to be embedded,

Serial No.: 10/824,528

if the magnitude relation between the characteristic amounts of the pair of blocks coincides with the code to be embedded, then said encoding unit maintains the magnitude relation between the characteristic amounts of the pair of blocks extracted by said characteristic-amount extracting unit, and

if the magnitude relation between the characteristic amounts of the pair of blocks does not coincide with the code to be embedded, then said encoding unit calculates an average of the characteristic amounts of the pair of blocks, calculates respective new characteristic amounts for the pair of blocks by calculating a new characteristic amount for a block having a smaller characteristic amount in the pair of blocks by adding a predetermined value to the average and calculating a new characteristic amount for a block having a larger characteristic amount in the pair of blocks by subtracting a predetermined value from the average, and generates the image data in which the characteristic amount of each block in the pair of blocks is changed to the respective calculated new characteristic amounts; and

an image-data decoding device that includes:

a dividing unit that divides the image data into a plurality of blocks;

a characteristic-amount extracting unit that extracts a characteristic amount of each of the blocks, and

a decoding unit that extracts a code from a pair of blocks based on a magnitude relation between the characteristic amounts of the pair of blocks.